



## Future Market Outlook And Opportunities

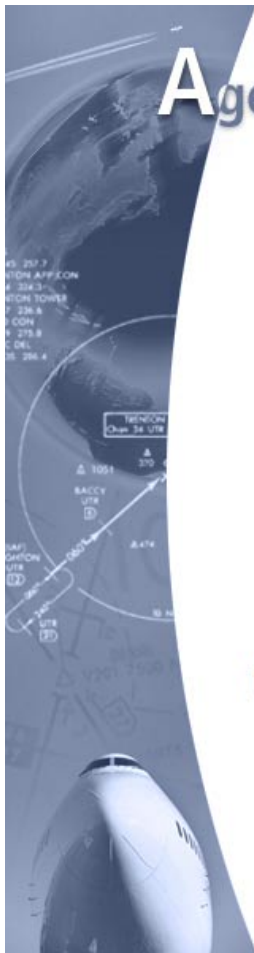
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Vice President, Marketing  
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Hello! It's a pleasure to be here today to talk about the "Future Market Outlook And Opportunities." We spend a lot of time and effort at Boeing studying the market to understand what new products and services we need to offer our customers.

Over the next 20 minutes, we will be talking about a number of factors shaping future airline fleet size, fleet mix and airport as well as air traffic management capacity requirements over the next 20 years.



## Agenda:

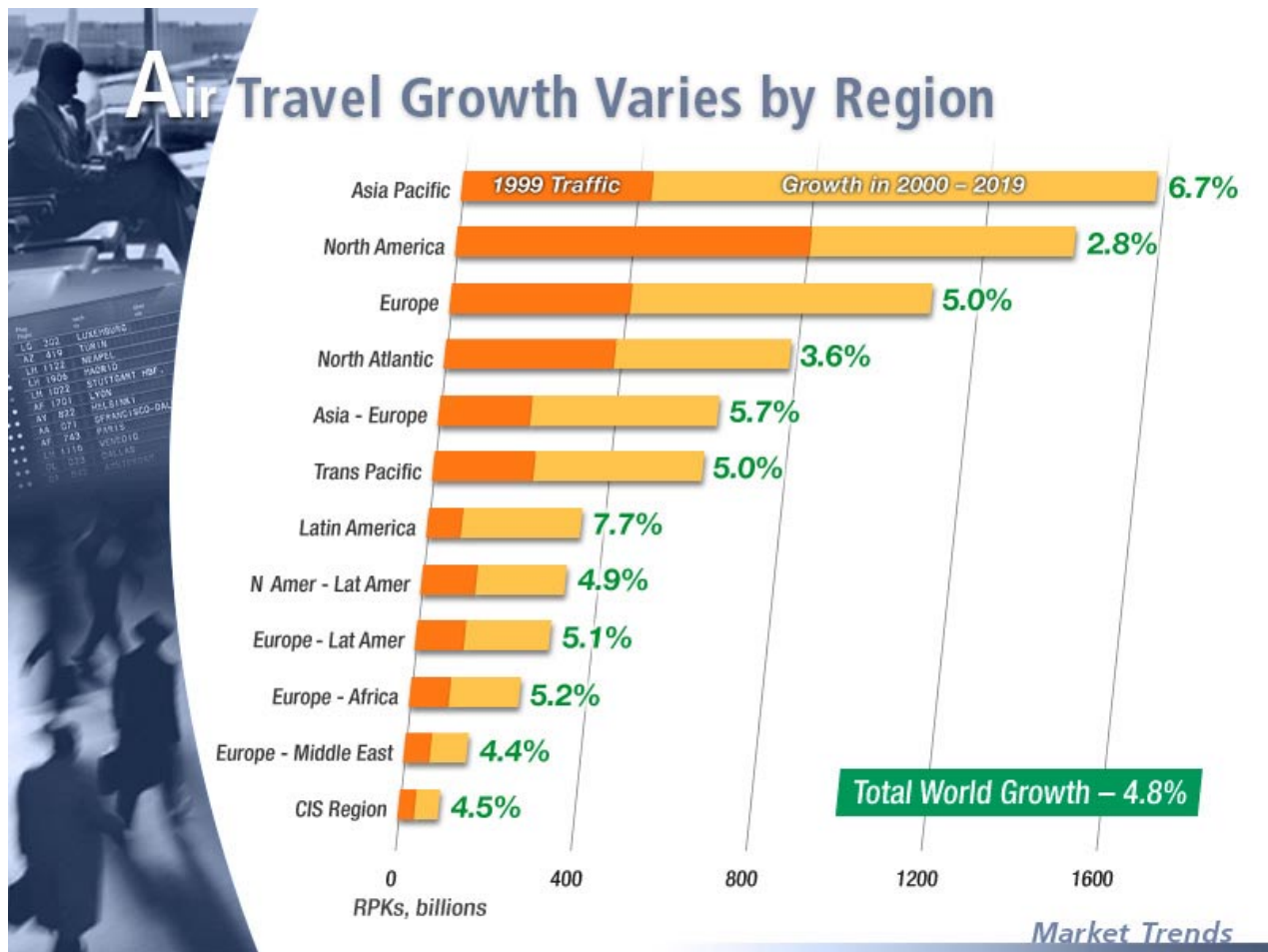
- **Market Outlook - Air travel and airplanes**
- **Differing views - Boeing and Airbus**
- **Market drivers - Passengers and competition**
- **Congestion - Infrastructure and constraints**

### *Market Trends*

My presentation can be separated into four general areas. The first is our Current Market Outlook which covers the demand for air travel and airplanes during the 2000-2019 period. We will then discuss the Boeing and Airbus outlook for very large airplanes.

Both manufacturers look at the same market drivers but come to remarkably differing views of how airlines will accommodate air travel growth during the next twenty years. Our view is that passenger preference for more frequent, non-stop flights will continue to drive market evolution and airline strategies.

Finally, we will discuss the potential role of very large airplanes in easing U.S. airport congestion and introduce Boeing's new business unit formed to address global ATM issues.

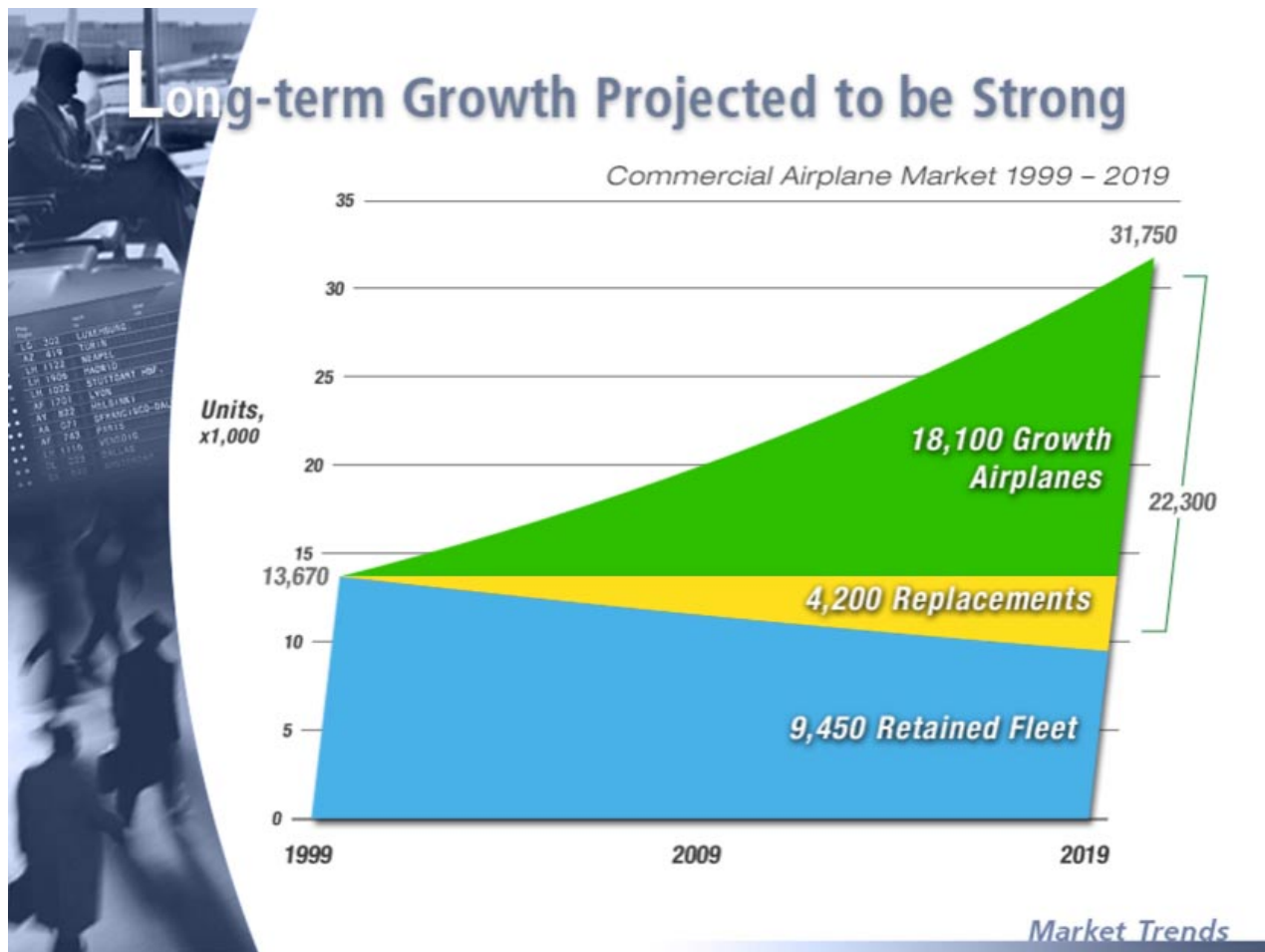


Let's review our twenty year forecasts of airline revenue passenger-kilometer growth by major world regional flows. As you'd expect, the rate of growth varies by region. The projected volume of air travel depends on the current market size as well as their future growth rates.

We forecast the fast growing Asia/Pacific market more than triples in size. North America is a mature market. Growth rates are accordingly low. But the North American market contributes substantially to future travel volume because it has such a large traffic base. And when it comes to the demand for airplanes, the replacement market in North America is larger. In intercontinental markets rapid growth in the Transpacific and Europe-Asia markets creates almost as much demand as the larger but slower growing North Atlantic. Latin America (the 7<sup>th</sup> largest market) remains the fastest growing market at 7.7%.

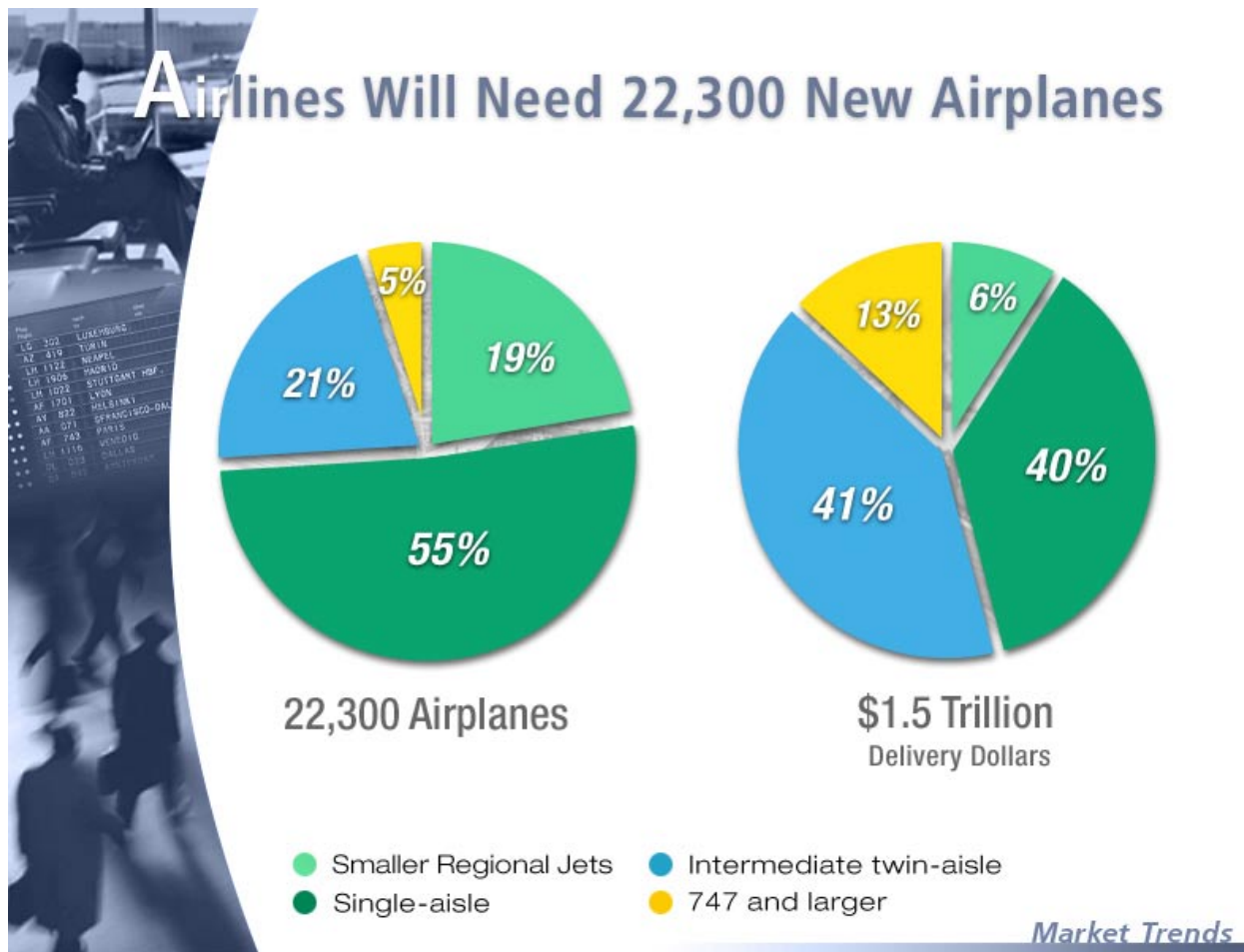
Overall, we project that world air travel will grow on average 4.8 percent over the next 20 years. Long term growth is projected to be strong.

Next let's look at the size of the world airplane fleet necessary to accommodate the above growth as well as replacement market through 2019.



With more and more people traveling, airlines will need more airplanes – and they'll need to replace some of those currently in their fleet. The world airline fleet is forecast to grow from the 13,670 airplanes in the year-end 1999 fleet to almost 32,000 airplanes by 2019.

More than 9,400 airplanes currently flying will still be in the airline fleet at that time. Over 4,200 airplanes will be needed to replace airplanes that will be removed from the fleet over the next twenty years. And more than 18,000 airplanes will be required to accommodate the growth in world air travel.

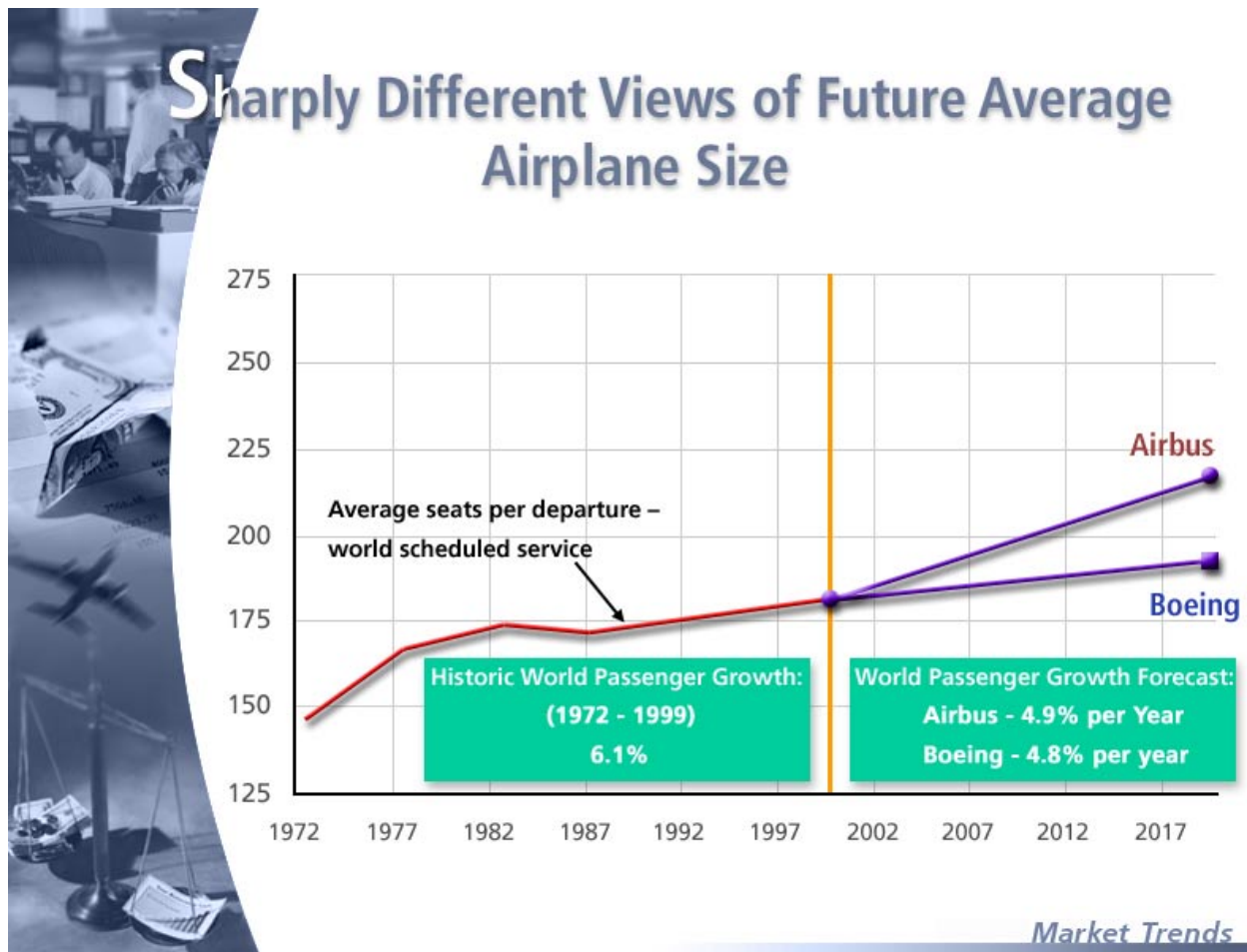


We project that over the next 20 years airlines will need 22,300 new airplanes. What is the size/range distribution of these 22,300 airplane deliveries?

- We see the smaller regional jet market as the fastest growing segment, accounting for 19 percent of deliveries in the next 20 years. That's a requirement for over 4,200 airplanes.
- Larger regional jets and single-aisle airplanes will still represent the largest segment of the fleet. This segment accounts for 55 percent or just under 12,400 deliveries.
- The intermediate size twin-aisle market grows steadily with over 4,700 deliveries or 21 percent.
- The remaining segment, the 747 & larger size accounts for only 5 percent of unit deliveries in the 2000-2019 time period, or just over 1000 airplanes.

These airplanes are worth over \$1.5 trillion with more than 80% of the value in single-aisle and intermediate twin-aisle.





A comparison of average airplane size (number of seats) in Boeing and Airbus forecasts illustrates the differing view on how future growth will be accommodated.

Boeing and Airbus forecast similar air travel growth rates over the next 20 years, but it's how the airlines accommodate future growth that differentiates the two forecasts.

The Boeing forecast is based on traffic growth continuing to be met with more point-to-point flights and additional frequencies in existing city pair markets, not larger airplanes.

The Airbus forecast suggests a new trend to larger airplanes. Airbus sees a future world where airport constraints are a leading factor dictating large airplanes.

Let's consider the major factors that we see influencing airlines' fleet decisions, especially in the world's major long-haul markets where very large airplanes are most likely to be found.



We believe the interaction between changes in government regulation, improvements in airplane capabilities, and airline strategies determine airplane selection and fleet mix.

Government regulations have been a critical factor in shaping the structure of the airline industry. Over the last 20 years, we've seen a dramatic shift from regulated to deregulated domestic and regional markets. We have also seen increased liberalization - even "open skies" in international markets.

Airplane capability has also reshaped airline networks. Today, airlines have a much greater selection of airplane capacity and range combinations.

The combination of changing regulation and improved airplane capabilities has shaped airline strategies in recent years.

Let's look at how airline strategies changed to focus on what this business is all about. Serving the passengers!



Today, passengers drive airline strategies. So, what are passengers looking for?

- Safe, reliable service
- Nonstop flights, at times they want to go
- Low fares in comfortable surroundings

With this in mind, let's talk about the evolution of air travel. Boeing and Airbus forecast similar air travel growth rates over the next 20 years, but it's how airlines accommodate future growth that differentiates the future fleet mix forecast. Boeing's fleet mix forecast focuses on the evolution of airline service from the regulated era to today's more deregulated competitive environment and what passengers are looking for. Passengers are looking for more point-to-point service rather than circuitous routings through two hubs.





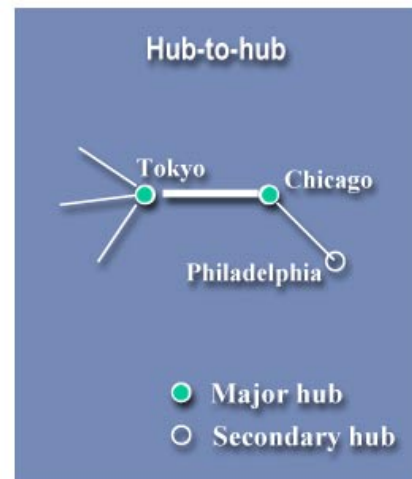
# Point-to-Point Services Will Grow More Rapidly Than Hub-to-Hub Trunk Routes

(Japan to Philadelphia Passenger)

## Boeing View



## Airbus View

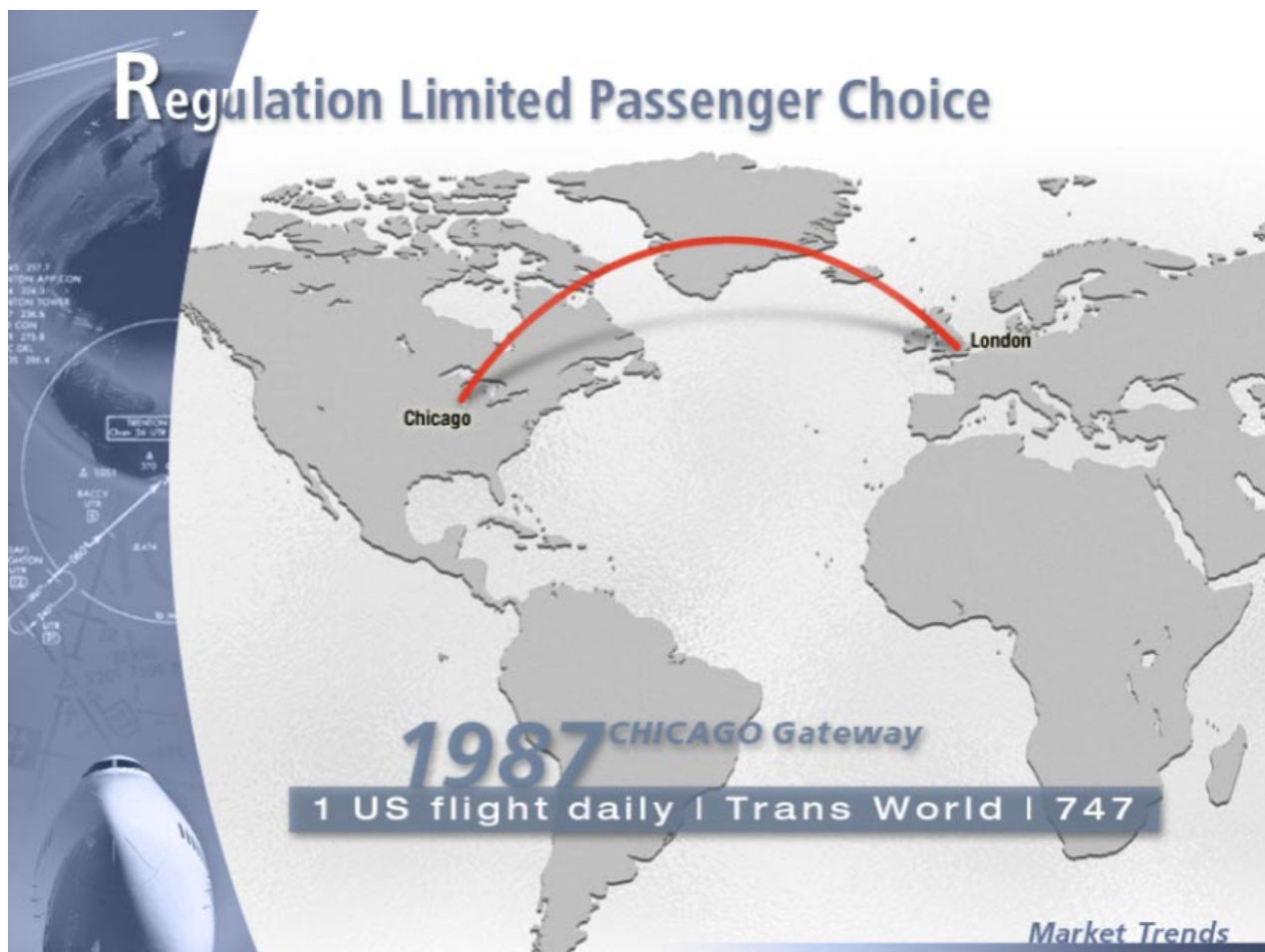


*Market Trends*

The Boeing fleet mix forecast is based on the continuation of airlines giving passengers more of what they want, that is, more point-to-point flights bypassing hub airports. This does not suggest, however, that passengers will avoid hubs altogether. Most passenger trips begin in hubs or pass through or connect at one hub.

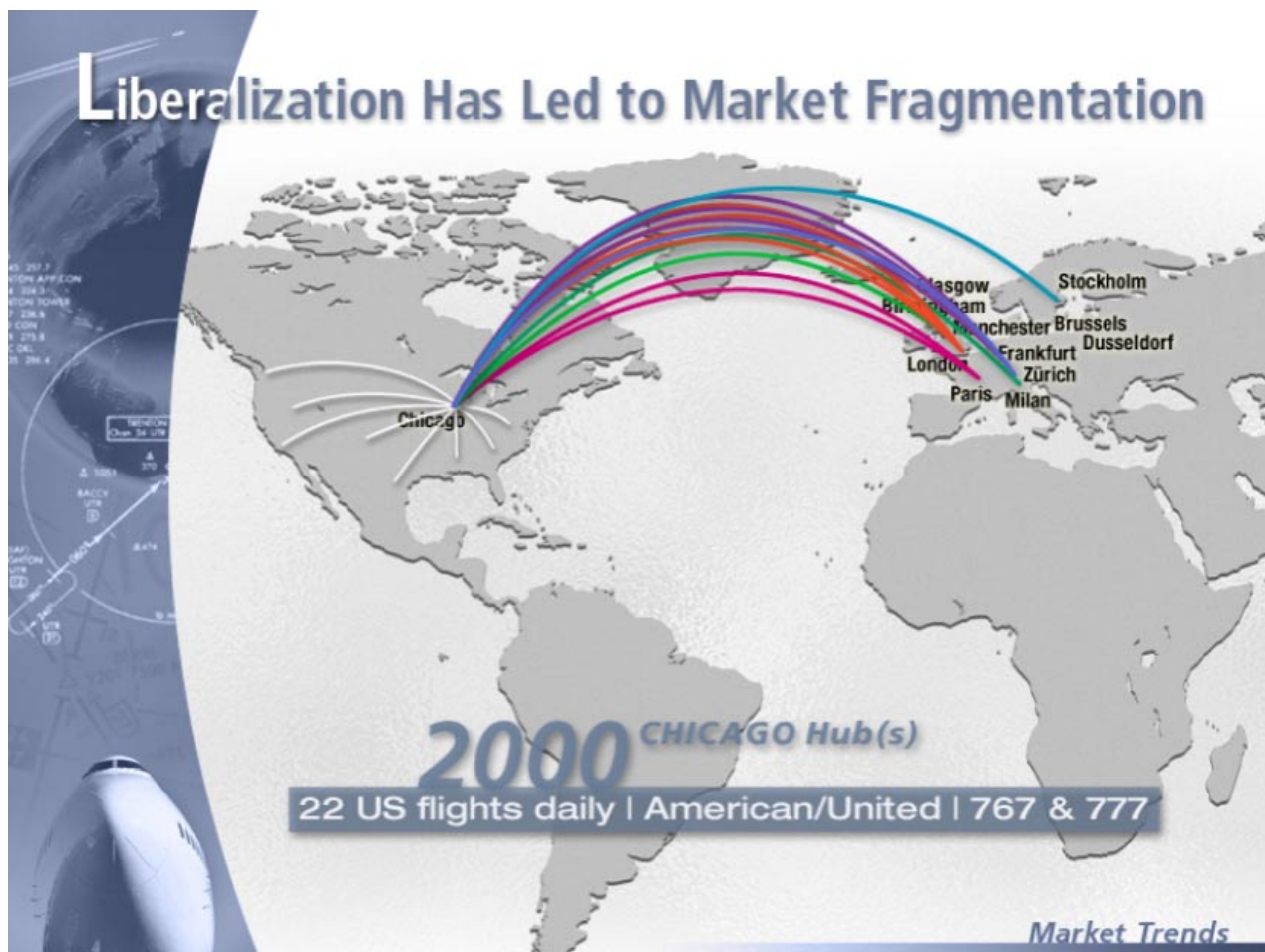
The Airbus view is that airport constraints and low seat-mile cost airplanes will lead to a renewed growth in hub-to-hub services. This would suggest a reversal in the two decade old trend to more frequent, nonstop flights to accommodate air travel growth, rather than larger airplanes being operated on a few large trunk routes.

Let's look at some examples.



Deregulation in the US domestic market led to international liberalization. Liberalization has had its biggest effect in the North Atlantic. A good example is the Chicago-Europe market. In 1987, there was one US airline flight/day from Chicago to Europe, a TWA 747 flight to London. At this time, 60% of U.S. airline flights on the North Atlantic were 747s.

US flag carriers Pan Am and TWA served Europe largely through flights originating at their New York gateway. These flights were dominated by low seat-mile cost 747s. Historically U.S. domestic airlines like United, American and Delta provided Pan Am and TWA with connecting services to interior U.S. destinations. With liberalization, airlines previously limited to domestic services began to offer more schedule choice using the smaller higher seat-mile cost 767. These choices included nonstop flights to Europe from their U.S. hubs. Air travelers naturally chose to fly these nonstop flights to Europe rather than the more indirect connecting flights to Pan Am and/or TWA's Europe bound New York flights.



Today, United and American Airlines are operating 22 daily nonstop flights from their Chicago hubs to eleven European destinations using a mix of 767 and 777's. Several city pair markets are receiving multiple daily flights.

Today, 68% of US airline flights in the North Atlantic are 767s and 777s. Less than 3% are 747s. The major US airlines in the market are Delta, American and United. A significant share of the service they provide is from their domestic hubs.

Just as in the US domestic example, fragmentation of the North Atlantic will continue over the next 20 years using 767s and A330s. We project that these airplanes will provide almost 190 airport pairs with new nonstop services by 2019.



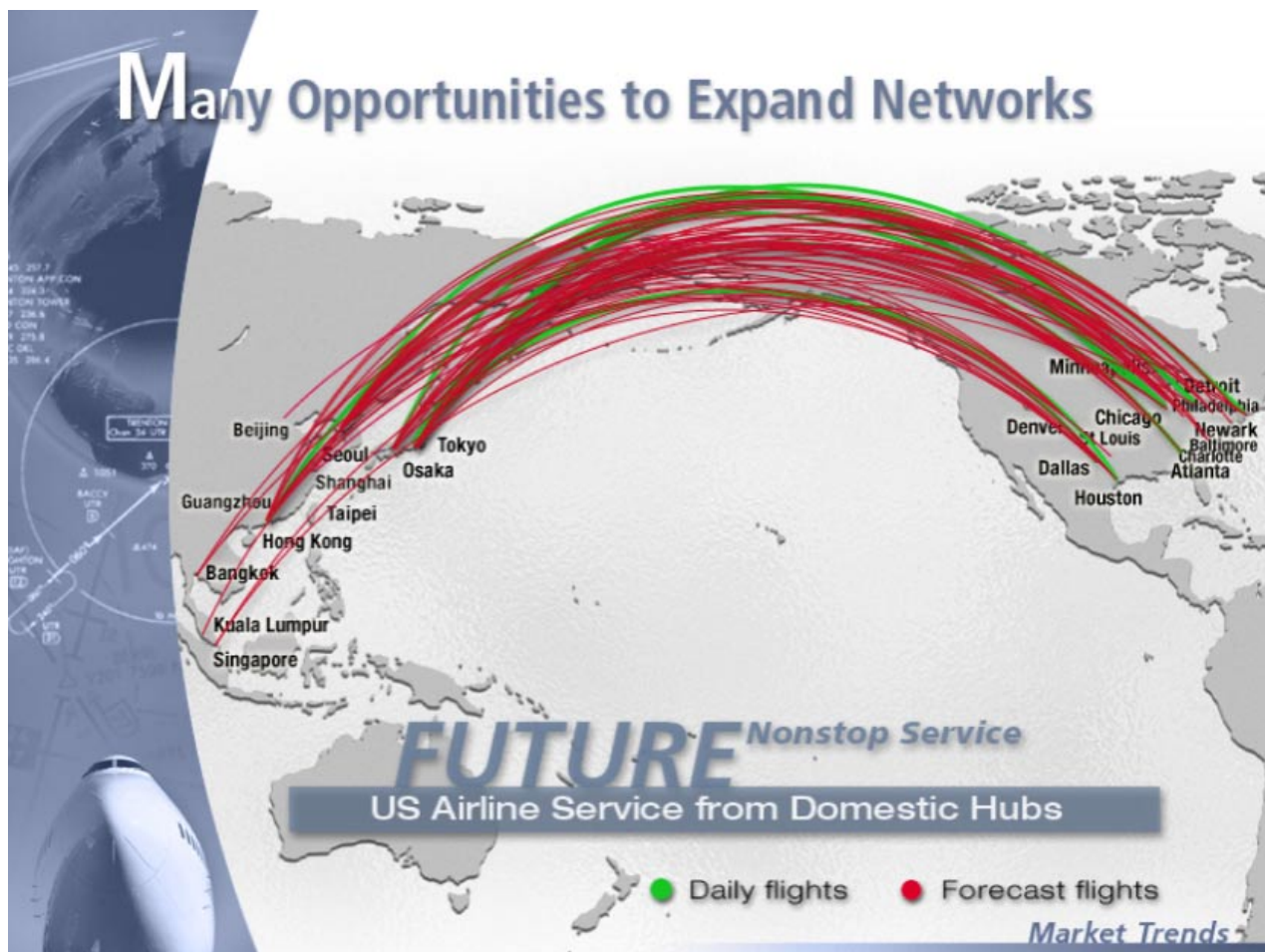
When you compare the North Atlantic network to Asia, there's a marked difference. Today US airline domestic hubs are linked to very few destinations in Asia with nonstop flights. Most service is from New York and West Coast gateway cities (which are not pictured here).

Early stages of fragmentation are appearing however. Governments are moving to "open skies." The U.S. has signed open-skies agreements with Brunei, Malaysia, New Zealand, Singapore, South Korea and Taiwan.

It's interesting to note that two out of every three passengers traveling from the US to Asia are destined for places in Asia other than Japan. Yet nearly 80% of transpacific flights stop in Japan. This is a real disconnect with what passengers want.

The 1998 U.S.-Japan bilateral opened up services to new cities and new carriers. This regulatory change and introduction of 777 airplanes has already dramatically changed the way airlines serve the Japan-U.S. market.



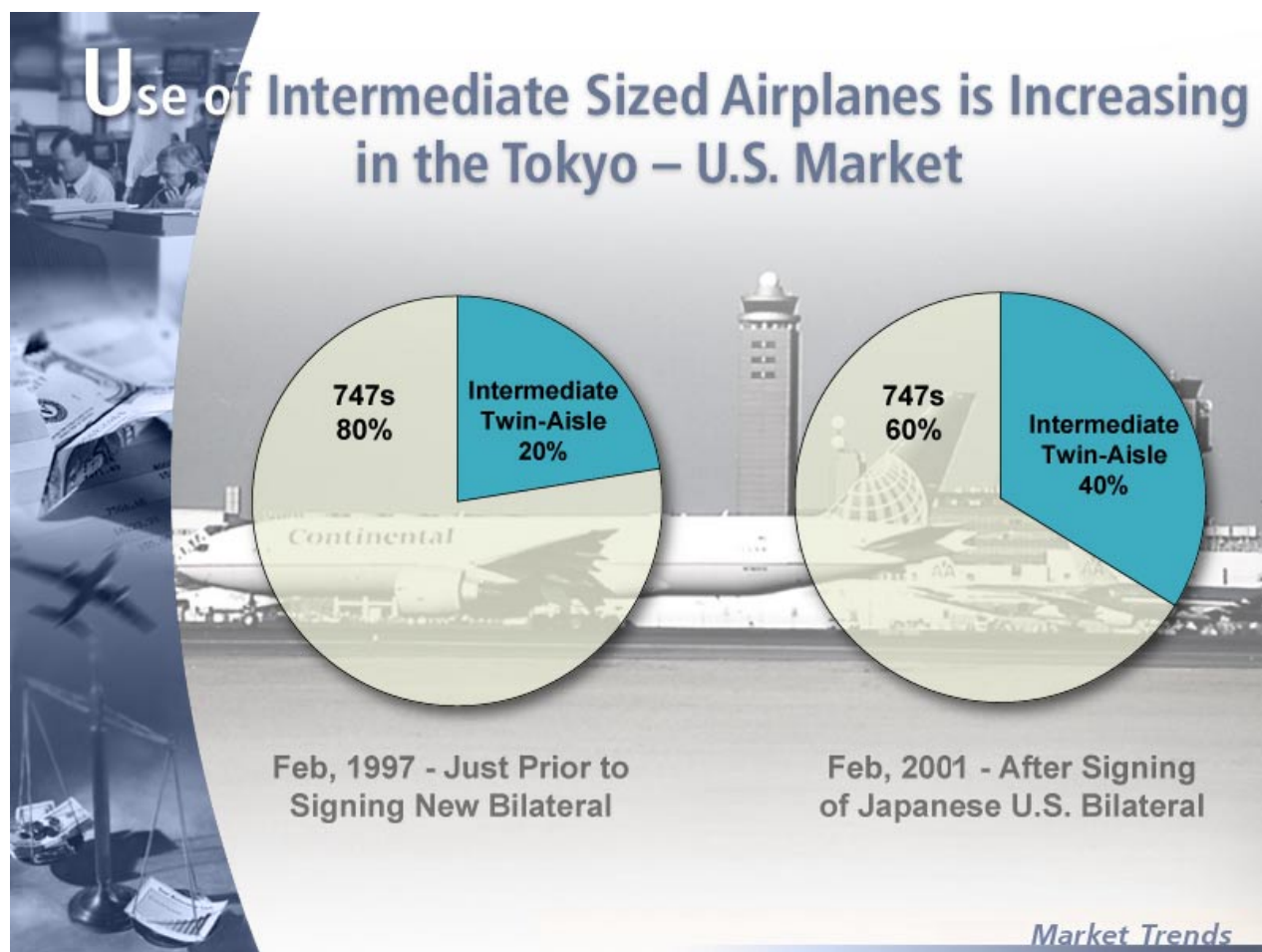


Obviously, there are many opportunities to expand airline networks over the Pacific.

We think that the 777-200ER, along with new, longer-range derivatives of the 777...and the A340...will accelerate this change. These airplanes will open the Pacific market to what the passenger wants – more nonstop flights.

Two examples of the trend to more non-stop flights and the reflow of passengers away from the historic large trunk routes are the recently announced United Airlines' Chicago-Beijing and Continental's Newark-Hong Kong flights. Both these flights will be operated with 777-200ER airplanes. Passengers who previously flew via Tokyo to these destinations will now literally fly over Tokyo. This recurring phenomena has led to the largest trunk routes growing more slowly than average regional growth rates. Moreover, as passengers move to these new non-stop flights, average airplane size has declined.





We've said for several years that the key to fragmentation in the Pacific was a more liberal Japanese bilateral. We've incorporated a more liberal agreement into our assumptions. And now, of course, it's no longer an assumption ...today, it's reality.

The Japan -U.S. bilateral agreement signed in 1998 provided Northwest and United as well as Japan Airlines and All Nippon "open skies" traffic rights. Other airlines including Delta, American and Continental were granted new route opportunities. As Japanese and U.S. airlines introduced new flights, airlines were under pressure to change the mix of airplanes in the market. This is an example of fragmenting markets impacting airline fleets.

This chart shows how use of the intermediate twin-aisle, e.g. 777s, increased from 20 percent of flights in the Tokyo-U.S. market just prior to the 1998 bilateral, to 40 percent by February 2001. Conversely, the use of 747s decreased from 80 percent in 1997 to 60 percent of total flights from Tokyo to the U.S., in 2001.

Narita is often used as an example of a very congested airport where airplane size can only go up. Recent developments in the Narita - U.S. market doesn't support this premise. With the introduction of greater regulatory freedom, airlines added flights and more point-to-point services to provide more flight choice as demanded by passengers.



## Competitive Airline Environment Drives Airplane Size Down

Average Seats per Airplane - Mile

	Regulated Era		Deregulated Era	
	1971		1987	2000
North America (Deregulated in 1987)	121	↑	154	↓ 140
N. America – Europe (Liberalization in 1980s)	208	↑	313	↓ 276
Europe – Asia (Early stages of liberalization )	140	↑	374	↓ 336
Intra Asia (Early stages of liberalization )	137	↑	240	↓ 220
N. America – Asia (Early stages of liberalization )	235	↑	343	↓ 347

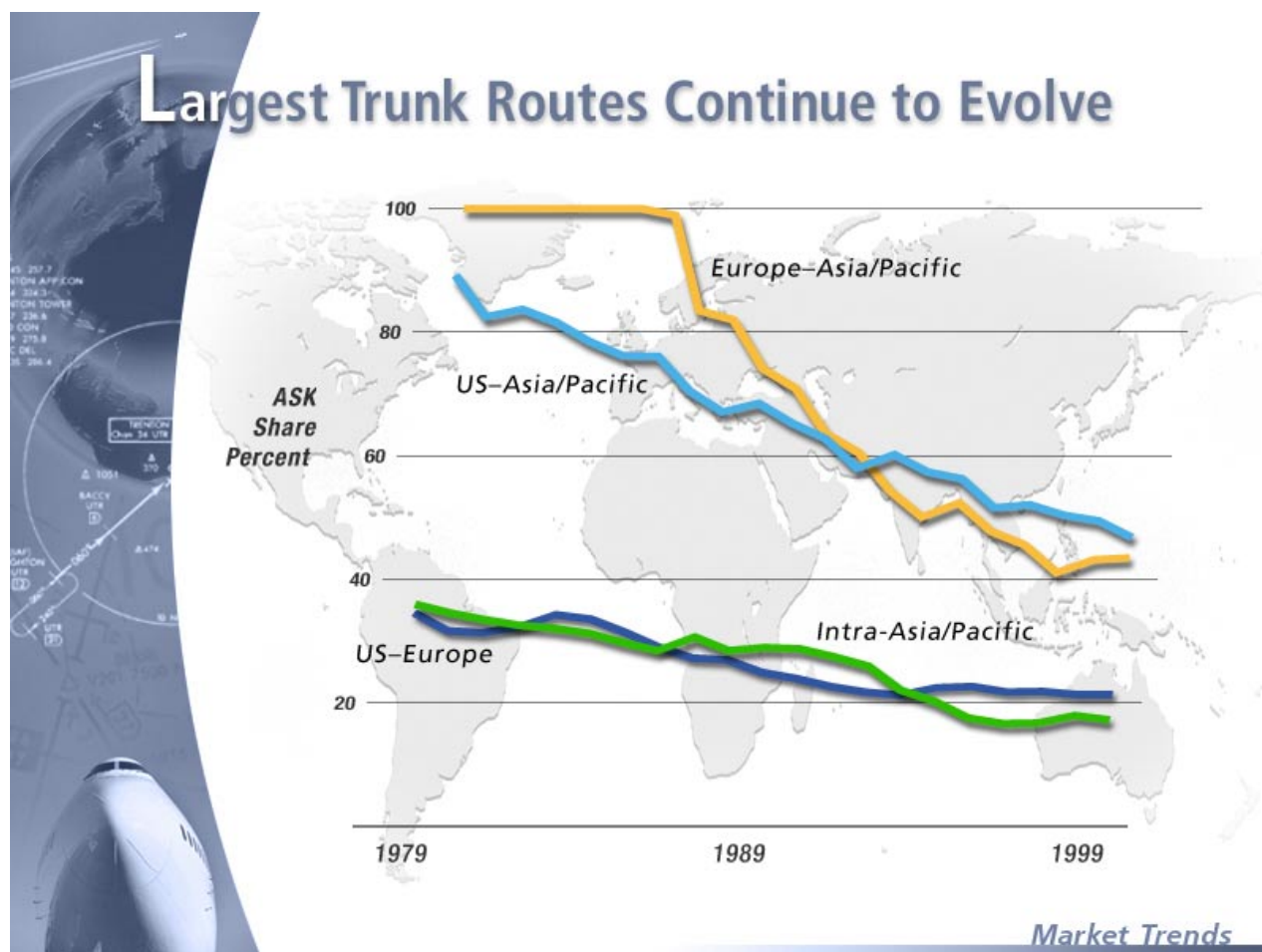
Regional growth met with smaller airplanes

*Market Trends*

Let's look at many of the world's largest regional markets. Average seat size shows a reversal in trend from the more regulated 1971-1987 period, compared to the latest period.

In the earlier regulated period, airline competition was limited by restrictive government bilateral agreements. In this environment low seat-mile cost airplanes were the most desirable because frequencies could be limited and fares were set based on average costs. Traffic growth led to larger capacity airplanes.

In the more recent period, characterized by more regulatory freedom airline strategies have been driven by passenger demand for more non-stop flights at times they want to go. Air travel growth led to increased frequencies and declining airplane size and not larger airplanes.



This chart shows the available seat kilometer share by all airplane types generated on the ten largest trunk routes. The above regional flows were selected because more than eighty percent of 747 available seat-miles were generated in these regions in 2000.

Let's look at the U.S.-Asia/Pacific market. As I said, this market has not fragmented much yet. But the top ten trunk routes share declined from over 89% in 1979 to 47% in 1999. Why do the top ten routes today account for so little share compared to over 20 years ago? Well, 20 years ago airplane range was limited. Only a few transpacific city pair markets could be served nonstop. Traffic flows, therefore, were concentrated over these few available routings. As we increased the range of the 747 airplane, more and more city pairs received nonstop service. Naturally passengers chose these new nonstop routings. This reduced the concentration of airline capacity over the trunk routes. To date, the Pacific market has fragmented more dramatically than the North Atlantic primarily based on increased 747 range. Market liberalization and the introduction of smaller airplanes with Trans-Pacific range has not yet contributed significantly to U.S. – Asia/Pacific market fragmentation.

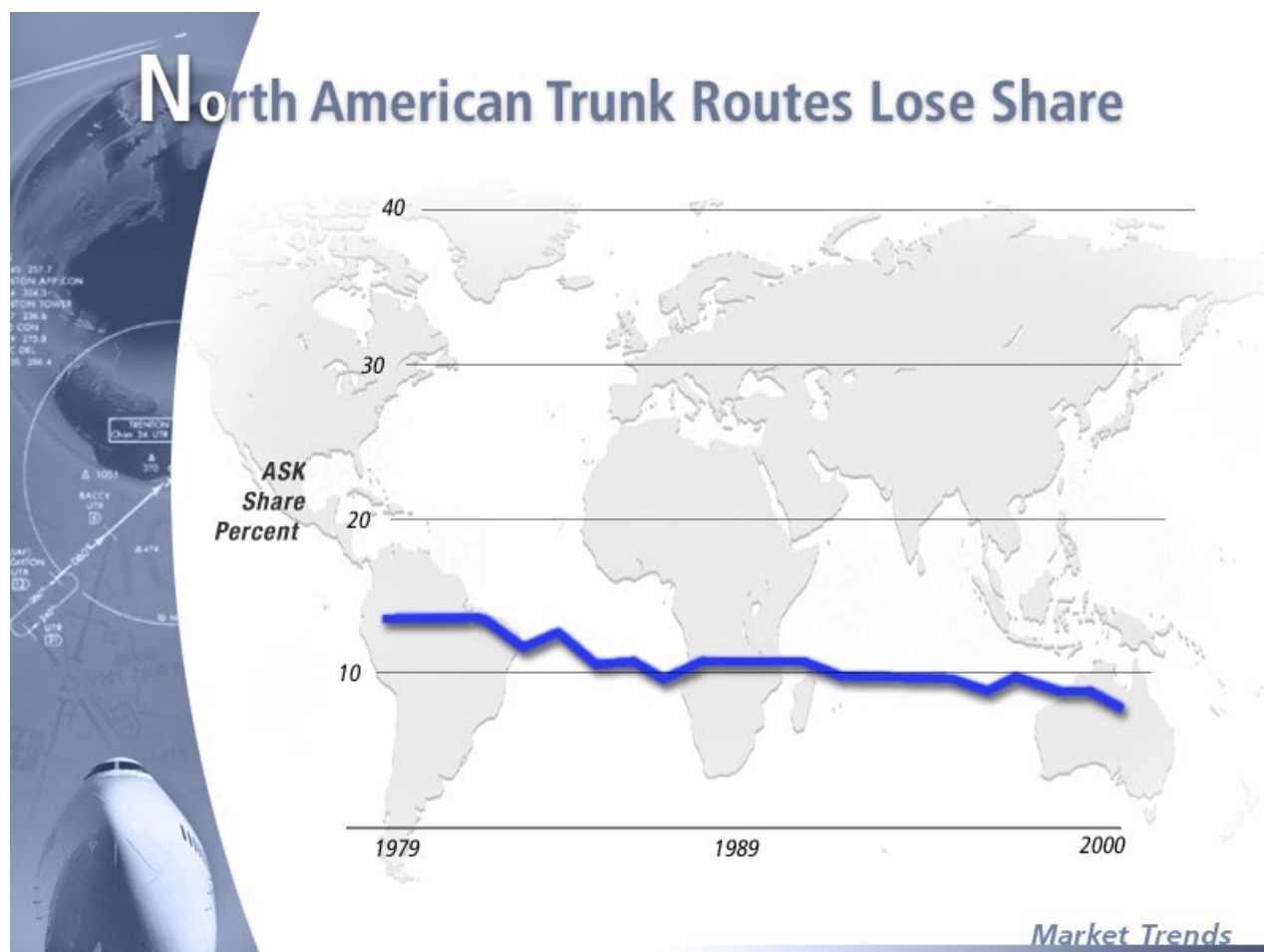
The decline in the dominance of trunk routes in the Europe-Asia/Pacific market was even more dramatic than in the U.S. – Asia/Pacific market. Trunk route domination declined from 100% on the 3 nonstop routes in 1979 to 44% in 1999. We couldn't find ten routes served nonstop in this market in 1977. This was because of airplane range and politics. Airplanes had the range to

fly nonstop from Europe to some Asian cities, but politics or the inability to fly over Soviet and Chinese airspace meant circuitous routings. This precluded most nonstop flight opportunities. Of course, the lack of range meant more stops and load building opportunities to fill larger airplanes.

We often hear that a few large Asian trunk routes dominate regional services. Yet, the top 10 intra-Asian trunk routes in 1979 recorded 36% of total regional ASKs, and today that share has fallen dramatically to 17%. Why did intra-Asia trunk route share decline? Although intra-Asia markets haven't liberalized after the U.S. and European model, regulators have let incumbent as well as new airlines enter more nonstop markets. This has pre-empted trunk route "connecting" traffic. In addition, this decline in trunk route share has slowed in the most recent period. Interestingly, this period includes the Asian economic crises that led to slower traffic growth and restrained airline expansion.

As you can see, the top 10 trunk route share of total U.S.- Europe available seat-kilometers (ASKs) declined from approximately 35% in 1979 to less than 21% in 1999. This is highly predictable in a market that is fragmenting.

Let's look at the intra-North American market for a few minutes.

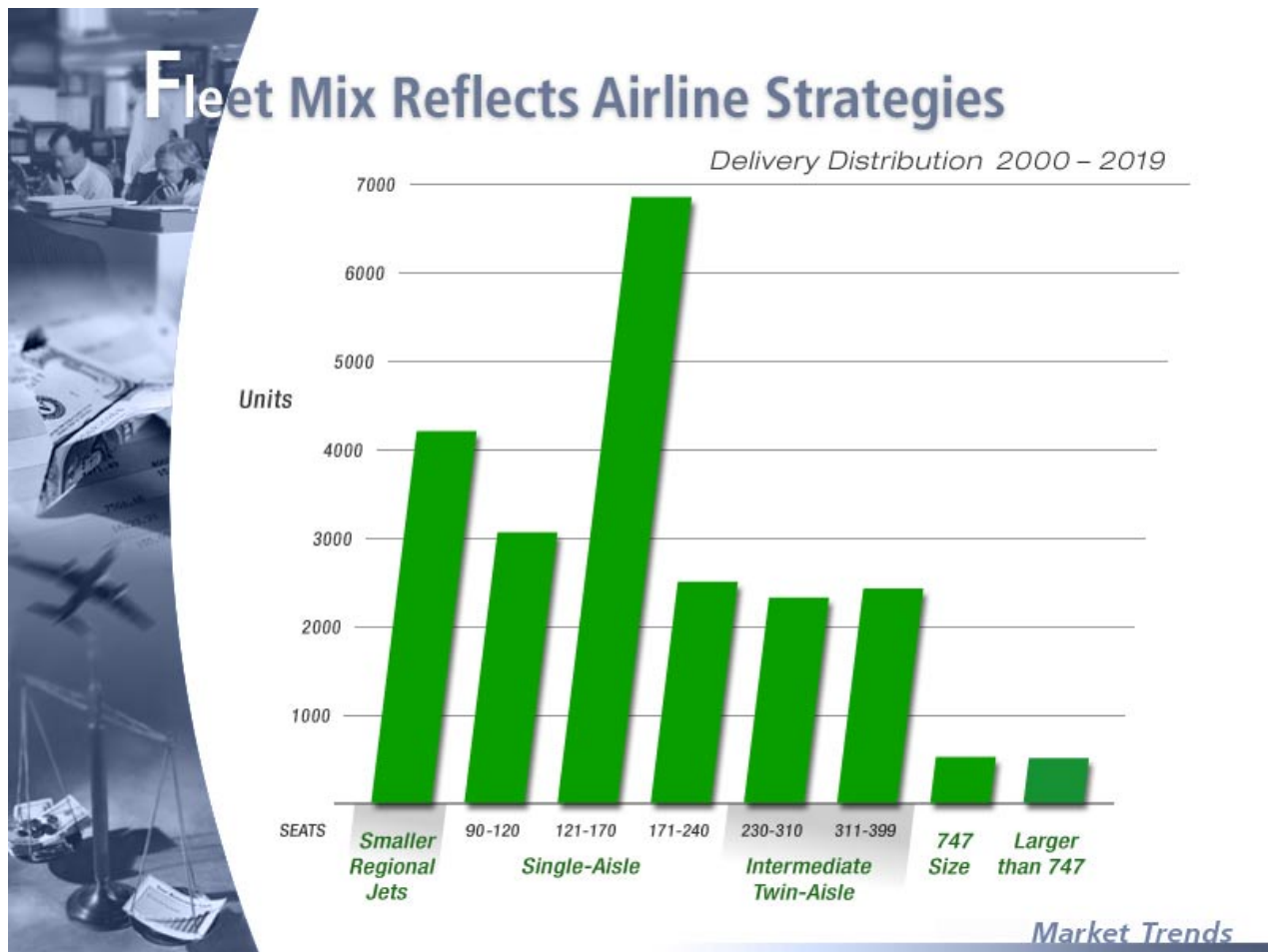


This chart shows the available seat kilometer share by all airplane types generated on intra-North America's ten largest trunk routes.

During the period shown above, the top ten North American trunk routes share declined from 14% in 1979 to around 8% today. It's interesting that in a period of airline consolidation and hub-and-spoke building, the largest routes grew more slowly than the industry average. The Airbus view is that airline alliances will lead to stronger hubs and greater than average growth on the largest trunk routes. We agree hubs will grow stronger, but we don't agree this will lead to the largest trunk routes growing faster than the regional average and gaining share.

We believe passenger choice will increasingly drive airline strategies in liberalizing markets. Moreover, passengers are primarily looking for non-stop flights at the times they want to go. This focus on passenger flight preference shapes our forecast of the future airline fleet mix.

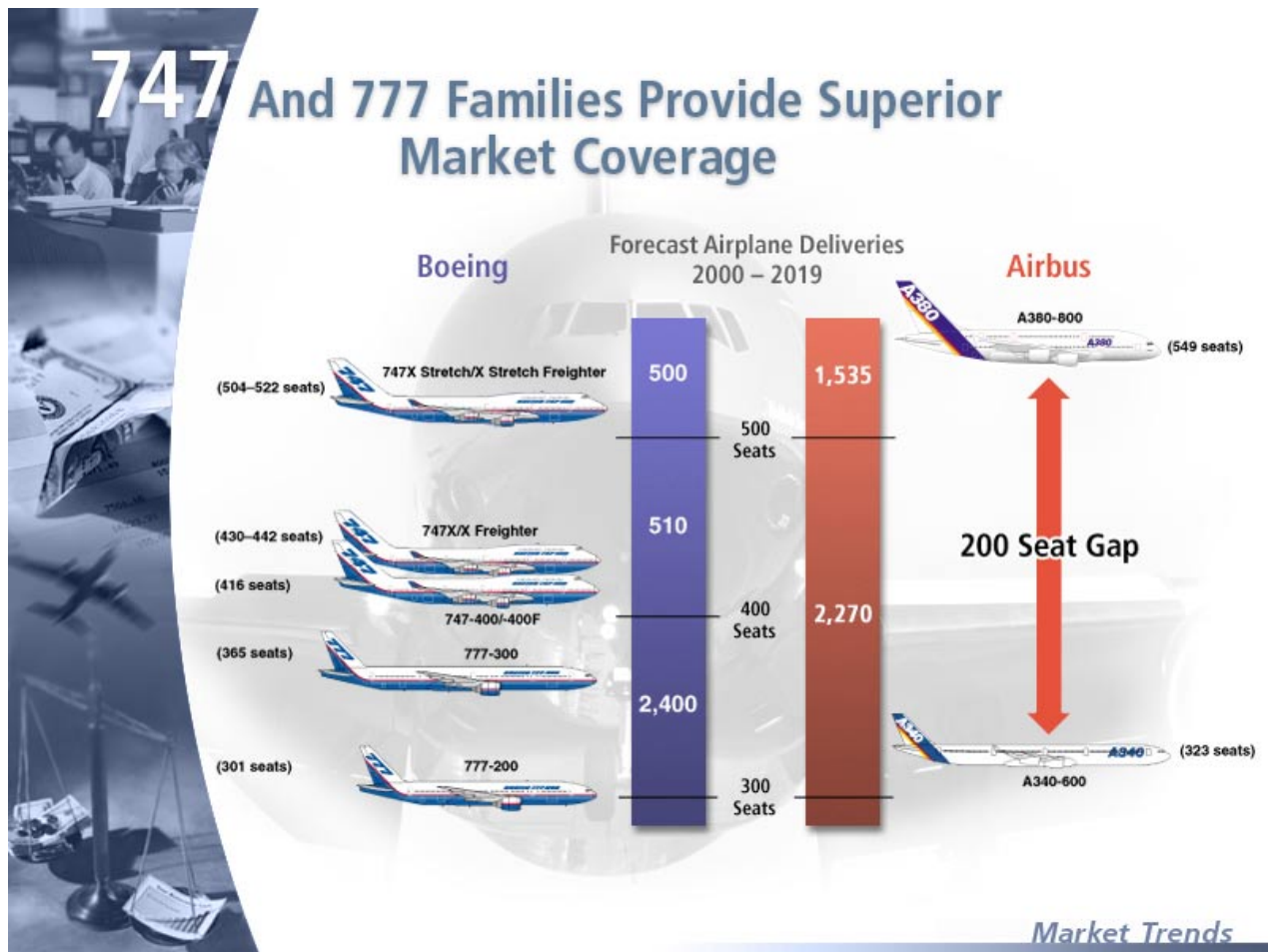




As the world continues to open its skies, the key trend we see is for airlines to offer more non-stop flights between more cities. We see this both within individual regions and in intercontinental markets.

It's no surprise that our detailed market by market assessment shows a strong demand for regional jets at one end of the spectrum ...and a small number of airplanes required in the larger than 747-400 segment.

As you can see, we think this latter market segment or niche is fairly small. The market for passenger airplanes larger than the current 747-400 is under 100 in the next 10 years. That's a total of about 330 to 2019. When freighters are added, the total number increases to approximately 500 airplanes larger than the current 747-400 in this market segment.



Let's take a closer look at the 747-400 and larger market forecast. Boeing is projecting a market of 510 airplanes in the 400-500 seat segment and 500 airplanes in the over-500 seat segment or a total market of 1010 airplanes.

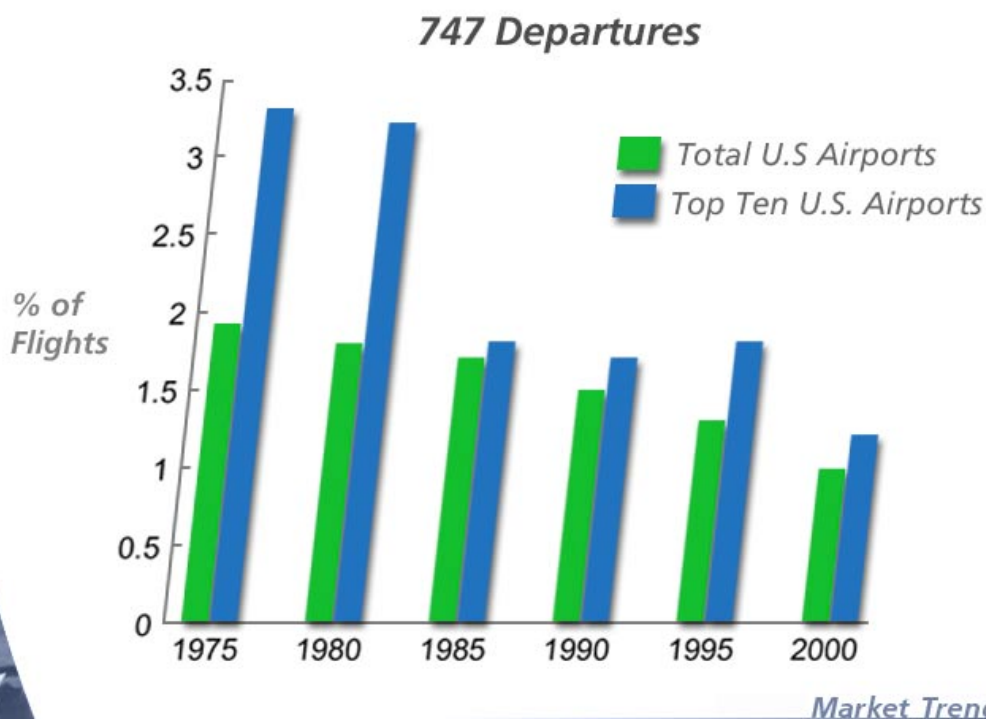
Airbus is projecting three times more, or over 1500 airplanes in the over-500 seat market segment, compared to the Boeing forecast.

We believe Airbus has a 200 seat gap in their large airplane product line. By focusing on the 550 seat market and larger, Airbus is counting on re-regulation and/or congestion to drive the market to very large airplanes. On the other hand, the 747X family is positioned to cover the 400 to 550 seat market. The 747X family in combination with our 767 and 777 families is positioned to accommodate continued market liberalization. Our goal is to provide the broadest widebody product line to meet our customers' size and range requirements in the next two decades.

The 747X family offers advanced technology design based on proven success and value. We believe these airplanes will provide our customers with the best solution to remain competitive in tomorrow's challenging markets.



## Big Airplanes Offer Little Congestion Relief



The Airbus large airplane forecast is partly based on congestion driving the market to very large airplanes. We are a little humbled by this argument. It was one of the main drivers behind launching the 747 airplane in the 1960s (the others were rapid air traffic growth, the advantages of low seat-mile costs in a regulated environment and the development of high bypass ratio engines).

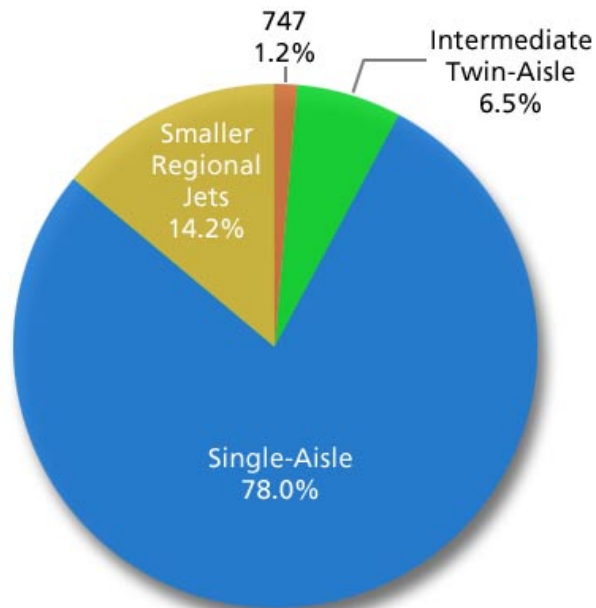
Let's review the 747's departure share trend in the increasingly congested U.S. market in the 1975 to 2000 period. The 747's share of total U.S. airport departures declined from slightly less than two percent in 1975 to one percent in 2000. If we look at the top ten U.S. airports in terms of flight departures, we see the 747's share declined even more rapidly. The market dynamics of congestion, hub building and airline consolidation didn't lead to an increased 747 departure share.

Some are suggesting that very large airplanes represent a solution to U.S. airport congestion. We find it somewhat implausible that on-board libraries, spas, work out rooms or other in-flight amenities on very large airplanes will reverse the decline in large airplane departure share.



## Smaller Airplanes Dominate Flights

% of Total Departures at Top Ten U.S. Airports (2000)



*Market Trends*

The challenge of solving U.S. airport congestion by adding very large airplanes is illustrated in this chart. Small airplanes dominate departures at the largest airports. The overwhelming number of flights - 93 percent - are single-aisle airplanes. Increasing the average size of single-aisle airplanes would increase airport capacity faster than adding a few very large airplane flights.

This departure domination by smaller airplanes is characteristic of the top airports around the world. For example, single-aisle airplanes accounted for more than two-thirds of the departures at London's Heathrow airport. Airplanes with 300 seats or greater, on the other hand, accounted for only twelve percent of total departures in August 2000.





# Increased ATM Capacity Only Acceptable Long-Term Solution

- Air traffic system supports economic growth
  - Airport capacity is necessary to support global, national and local economic growth
  - A heavily constrained system would lead to reduced flight choice
- Boeing formed a new business unit in November, 2000 to develop innovative approaches to developing global ATM solutions.

*Market Trends*

We recognize that increased air traffic management(ATM) capacity has global, national and local political and economic aspects. One certainty is the importance of ATM capacity to national and regional economic growth prospects.

Today, the world airline industry transports forty percent of world trade by value. It is estimated the economic impact of aviation on the gross world output is more than \$1.3 trillion.

Business today is increasingly global and mobile. Business growth will seek out those areas providing the best business environment. The unrestricted access to the world air transport system is a strong competitive advantage to regional and local economies prospecting for new business opportunities. New businesses or established businesses looking for competitive advantages will move to nations and regions where airports are able to satisfy the demand for frequent, non-stop service to regional and world markets.

We have formed a new business unit to work with the numerous stakeholders in the world's ATM system. We believe the technology already exists to provide significant system improvements - the technical challenge is integrating all the elements into an effective air traffic system. Creating more capacity requires fundamental change to how the system operates and meeting the political, economic and environmental challenges at all government levels.



**Over the next 20 years—**

- ### Market Trends

By staying in touch with the market - with what our airline customers and their passengers demand - we're confident that Boeing will remain the industry leader by offering integrated customer solutions. To this end, Boeing has set up a new business unit to address global air traffic management issues.



Forever New Frontiers

